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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ROY, SIKHA

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 04/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/413,774

Applicant(s)

ITO ET AL.

Examiner

Sikha Roy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-27, 30-35, 37-45, 56-84 and 91 is/are allowed.
- 6) ☐ Claim(s) 49-55, 85-90, 92 is/are rejected.
- 7) ☒ Claim(s) 28, 29, 36 and 46-48 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1 ☒ Certified copies of the priority documents have been received.
- 2 ☐ Certified copies of the priority documents have been received in Application No. _____.
- 3 ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other

DETAILED ACTION

The Amendment (Paper # 10), filed on November 5 2001 and received on January 29 2002, and Supplemental Amendment (Paper# 11) filed on January 4 2002, have been entered and are acknowledged by the Examiner.

New claims 43-92 have been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 28,29,36,46-48 are rejected under 35 U.S.C. 112, second paragraph, as failing to particularly point out and distinctly claim the subject matter which applicant(s) regard as their invention.

Claims 28,29,36 recite the limitation "said first member" in claim 27. There is no mention of first member in claim 27 and hence there is insufficient antecedent basis for this limitation in these claims

Claims 46-48 recite the limitation "said first member" which has no previous mention in the claims rendering insufficient antecedent basis for this limitation in these claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 85,86 and 92 are rejected under 35 U.S.C. 102(e) as being anticipated by U. S. Patent 5,939,822 to Alderson.

Regarding claims 85 and 92, Alderson discloses (column 1 lines 54-64) a flat panel display comprising electron emitting cathode layer formed on a first substrate, an anode layer formed on the inside surface of a transparent view screen and phosphors coated on the anode layer, the backing layer and view screen spaced apart by first member (spacer) and sealed together hermetically. The spacers with a predetermined height maintain the vacuum gap between the phosphors and the electron emitting (cathode) surfaces at a selected distance. Alderson further discloses (column 5 lines 19,20) a part of the surface of the first member (support structure) is provided with uneven geometry (fluted with grooves and channels) so as to reduce the average

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coefficient of secondary electron emission. Figs. 7-9 illustrate the fluted surface of the first member.

Referring to claim 86, Alderson discloses the spacer is formed of an insulative material (claim 15) and the spacer's side surfaces and one of top and the bottom surfaces are coated with a high resistance film.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 49-55, 86-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,939,822 to Alderson.

Alderson discloses (column 1 lines 54-64) an electron beam apparatus (field emission display) comprising electron emitting cathode layer formed on a substrate, an anode layer formed on the inside surface of a transparent view screen and phosphors coated on the anode layer, the backing layer and view screen spaced apart by first member (spacer) and sealed together hermetically. Alderson further discloses (column 5 lines 19,20) a part of the surface of the first member (support structure) is provided with uneven geometry (fluted with grooves and channels) so as to reduce the average

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coefficient of secondary electron emission. Figs. 7-9 illustrate the fluted surface of the first member.

Regarding claim 49, Alderson discloses (column 7 lines 62-65) fluting is parallel to the surface and alters the geometry of the surface of the spacer in relation to the electrostatic field lines such that most secondary electrons emitted by impinging electron will describe a trajectory back into the fluting rather than out of the fluting's mouth. The uneven geometry being parallel to the surface it will be obvious to one having ordinary skill in the art at the time of invention to specify the unevenness being arranged in two directions defining the plane of the surface for better trapping of the secondary electrons.

Regarding claim 50, the first member having uneven geometry (fluting) parallel to surface will have at least two different values of amplitudes corresponding to two directions. An unevenness in geometry is defined as one varying from one with even or single amplitude and hence it is obvious to one having ordinary skill in the art at the time of invention to modify the amplitude of the fluting geometry of the first member of Alderson with at least two different amplitudes for reducing the secondary electron emission process.

Regarding claim 51, the first member having uneven geometry parallel to surface will have at least two different values of cycle periods corresponding to two directions. An unevenness in geometry is defined as one varying from one with even or single cycle period and hence it is obvious to one having ordinary skill in the art at the time of invention to modify the cycle period of the fluting geometry of the first member of

Alderson with at least two different cycle periods corresponding two kinds of unevenness for reducing the secondary electron emission process.

Regarding claims 52-54, Alderson discloses (column 7 lines 25-30) the flutings on the surface of the first member can be composed of various shapes, angular, rectangular, rounded channels or grooves providing random amplitudes or cycle periods of the uneven geometry.

Regarding claims 55, 87 and 88, Alderson discloses spacer structure comprising of an insulative material and a high resistance film formed on the surface. Anderson further teaches unevenness (fluted geometry) along the sides of the spacer across the path of the flow secondary electrons from the cathode to the anode (column 7 lines 22-30). The thin film being formed on the surface of the spacer with uneven geometry it would be obvious to one of ordinary skill in the art at the time of invention to include the fine unevenness formed on the high resistance film, coated on the insulative spacer for further preventing secondary electron from escaping and traveling along the structure surface to the anode.

Claims 89 and 90 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,939,822 to Alderson in view of U. S. Patent 5,760,538 to Mitsutake et al.

Alderson does not exemplify the value of the surface resistance of the spacer and the high resistance film.

Mitsutake et al. in analogous art of electron beam apparatus disclose (column 9 lines 26-28) that a semiconductor thin film is formed on the surface of the spacer which

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has a surface resistivity between 10^5 and $10^{12} \Omega / \square$. With such high surface resistivity it can maintain the effect of preventing electrification of the surface.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include the surface resistivity of the spacer having a high resistance film of Alderson to be 10^5 and $10^{12} \Omega / \square$ as taught by Mitsutake et al. for maintaining the effect of preventing electrification of the surface of the spacer.

Allowable Subject Matter

Claims 1-25, 26, 27, 30-35, 37-42, 43-45, 56-77, 78-84, 91 are allowed over the prior art of record.

The following is the examiner's statement of reason for allowance.

Regarding claims 1, 43-45, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 1, and specifically comprising the limitation of an electron beam apparatus having the value of incident angle multiplication coefficient of secondary electron emission coefficient m_0 being equal to or less than 10.

Regarding claims 2-25, claims 2-25 are allowable for the reasons given in claim 1 because of their dependency status from claim 1.

Regarding claims 56-77, claims 56-77 are allowable for the reasons given in claim 43 because of their dependency status from claim 43.

Regarding claim 26, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 26, and specifically comprising the limitation of an electron beam apparatus having a first member with an uneven geometry and a deposited film on its surface, the thickness of the film being smaller than the top and lowest portions of the uneven geometry.

Regarding claims 78-84, claims 78-84 are allowable for the reasons given in claim 26 because of their dependency status from claim 26.

Regarding claim 27, the references of the Prior Art of record fails to teach or suggest the combination of the limitations as set forth in claim 27, and specifically comprising the limitation of a spacer having the value of incident angle multiplication coefficient of secondary electron emission coefficient m_0 being equal to or less than 10.

Regarding claims 30-35,37-42, claims 30-42 are allowable for the reasons given in claim 27 because of their dependency status from claim 27

Claims 28,29,36 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim 27 and any intervening claims.

Claims 46-48 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action

Regarding claim 91, the prior art of record neither teaches nor suggests an electron beam apparatus with all the claimed limitations particularly the height of the fine unevenness of the spacer-surface having a value in the range $.05\mu\text{m} \leq R_{\text{max}} \leq 10 \mu\text{m}$.

Response to Argument

Applicant's arguments with respect to claims 28,29 and 36 have been considered but are moot in view of the new ground(s) of rejection.

In response to the applicants' argument that the references do not teach or suggest a flat display apparatus having features recited in claim 85, the examiner respectfully disagrees. U. S. Patent 5,939,822 to Alderson discloses a flat panel display with all the limitations as claimed in claim 85 (please see the Office Action above).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art references are cited to further show the state of the art with respect to spacer-structure in field emission devices.

U. S. Patent 5,561,340 to Jin et al.

U. S. Patent 5,598,056 to Jin et al.

U. S. Patent 5,704,820 to Chandross et al.

EP 725418A1 to Jin et al.

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Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (703) 308-2826. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (703) 305-4794. The fax phone number for the organization is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

SR

Sikha Roy
Patent Examiner
Art Unit 2879

